

DEVICE FOR SMOOTHING OUT CLOTHING ITEMS

The present invention relates to a device for smoothing out a clothing item, in particular a clothing item for the upper body such as a shirt, a blouse or a jacket.

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It is known that clothing items may be dried and/or ironed or otherwise smoothed out by pulling them onto an inflatable body, also referred to as an inflatable mannequin, having essentially the shape of the clothing item to be smoothed, and then this inflatable body is inflated with air or steam from the inside. The inflatable body is inflated by the supply of air and/or steam, thereby stretching the ironing goods and/or drying goods from the inside. To achieve a uniform inflation of the inflatable body and thereby ensure good drying and smoothing results, the air and/or steam introduced into the interior of the inflatable body must be distributed in such a way that the inflatable body assumes the desired shape.

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15 German Patent DE 100 63 672 A1 therefore proposes creating a device for smoothing shirts, said device having a subdivided inflatable body. An outer inflatable body and two inner inflatable bodies arranged inside the outer inflatable body are proposed here. The inner inflatable bodies are each made of an air-permeable material and each has a body section and an arm section. The pressure in the outer inflatable body is created by the air coming out of the inner inflatable bodies, and openings may also be provided at the ends of the arm sections to permit a higher supply of air to the arms of the outer inflatable body.

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To dry areas of the clothing item in which there is more than one layer of fabric, it is also known that air-permeable areas may be processed in the inflatable puppet or openings in the form of holes may be provided in this area. One such embodiment is described in WO 99/49123, for example.

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The disadvantage of this device is that after a certain degree of drying is reached, there is an elevated loss of air at those locations where multiple layers of the clothing item must be dried.

The object of the present invention is therefore to create a device for smoothing a clothing item in which areas with several layers of fabric can be smoothed reliably while at the same time the loss of air and/or steam can be minimized and furthermore a good smoothing result can be achieved.

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This object is achieved according to the present invention by a device for smoothing clothing items, especially shirts, whereby the device has an outer inflatable body and an inner inflatable body, the outer inflatable body and the inner inflatable body each having a body section; in the inflated state, the inner inflatable body and the outer inflatable body are in contact with one another over a contact area and the material of the inner and/or outer inflatable body has at least one moderate air permeability in a permeable area which forms a part of the contact area.

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Due to this embodiment of the present invention, it is possible to utilize the advantages of providing an inner inflatable body while at the same time creating a targeted air supply to a few areas of the clothing item. According to this invention, the inner inflatable body may exert a supporting function in which it imparts a desired shape to the outer inflatable body. Furthermore, the inner inflatable body may also serve to supply air to the outer inflatable body and to the clothing item. These advantages may be utilized ideally according to the present invention because in the inflated state there is contact between the inner and outer inflatable bodies over a contact area. This contact may be created via the inner inflatable body due to the fact that the inflatable body stretches in the direction of the outer inflatable body until the two are in contact. However, this contact may also be created from the outside by a clamping device which presses the outer inflatable body against the inner inflatable body. In this area, due to the pressure difference prevailing between the environment and the inner inflatable body, a greater discharge of air to the environment and thus to the clothing item is achieved than in those areas where the inner and outer inflatable bodies are not in direct contact. In the latter areas, there is only the pressure difference between the environment and the outer inflatable body, which is lower than the pressure difference between the environment and the inner inflatable body.

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- 3 -

In at least a portion of the contact area which is also referred to as the permeable area, there is also an air permeability in the material of at least one of the inflatable bodies, so a further increase in air supply to the clothing item through this inflatable area can be ensured. Therefore, seams or areas having more than one layer of fabric, for example, can be smoothed and dried
5 ideally in the permeable area. The air permeability of the material can be created, for example, by selecting a textile material having the stated air permeability or by creating openings in a tightly woven material.

10 The contact area on the inner and outer inflatable bodies preferably extends over a portion of the body section, especially over the front side and the sides of the body section. As a rule, the side seams of shirts are placed in this area and chest pockets or applications are also provided in this area. Due to the contact between the inner and outer inflatable bodies, there is a greater pressure difference with respect to the environment in these areas, which improves the smoothing result.

15 The permeability area is preferably provided on the sides of the body sections of the inner and/or outer inflatable body. In this position, which corresponds to the position of a side seam on a shirt, an increased air supply to the clothing item and in particular to the seam can thus be ensured. On the side of the body of a clothing item, in particular a shirt, side seams are provided for connecting the respective front part of the shirt to the back part. These are often processed as
20 French seams and therefore contain four or more layers of fabric. An increased air supply is necessary in this area in particular.

If the permeable area can be provided on the inner inflatable body, then an adequate drying and smoothing of multilayer areas of the clothing item may also be achieved without forming
25 impressions on the clothing item due to seams or openings in the inflatable body. Seams on clothing items usually join two cut sections, each having one layer of fabric. In the area of the single layer of fabric, the air supply should therefore be as low as possible so that air introduced into the inflatable body can be prevented from escaping. The amount of air passing through the layer of fabric unused increases with a progressive degree of drying of the fabric. When using an

- 4 -

air-permeable area for drying a seam, it is therefore necessary for it to be formed by a separate cut section in the inflatable body which is sewed to cut sections of a lower air permeability, preferably to tight cut sections. Due to the pressure under which the inflatable body is in contact with the clothing item, the seams may be pressed onto the clothing item which may thus result in negative effects on the smoothing result. Openings which may also be provided in the inflatable body to permit drying of seams cannot usually be limited to the exact dimensions of the seams on the clothing item so that impressions may also be formed on the adjacent single layer areas of the clothing item.

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- 10 If the permeable area is provided on the inner inflatable body, the material of the outer inflatable body is situated between the inner inflatable body and the clothing item. Seams required for joining the permeable area to other areas, preferably nonporous, of the inner inflatable body are not transferred to the clothing item because the inner inflatable body is either not in contact with the outer inflatable body at the seams or the seams are separated from the clothing item by the
- 15 material of the outer inflatable body.

- In addition it should be noted that the inner inflatable body is to be used primarily for supporting the shape of the outer inflatable body. The shape of the outer inflatable body in the body area of the shirt should preferably have an oval cross section. This can be achieved if the inner inflatable
- 20 body is in contact with the sides of the body section of the outer inflatable body and press them apart there. Thus the contact in this area in addition to the controlled transfer of air to the side seam of the clothing item may also serve the purpose of ideal shaping of the outer inflatable body.

- 25 The permeable area may additionally or alternatively be situated in the chest area of the inner and/or outer inflatable body. In these areas, chest pockets or other applications are usually provided on shirts. Due to the air-permeable material in the permeable area and due to the fact that the two inflatable bodies are in contact with one another in this area, these parts of the clothing item where multiple layers of fabric are provided can also be smoothed ideally.

5 The material of the inner inflatable body preferably has a moderate air permeability in the permeable area, especially an air permeability in the range of 3 to 20 L/m²s, preferably from 5 to 10 L/m²s. Due to this moderate air permeability, it is possible for air to pass through this area but air is prevented from escaping from the inner inflatable body.

10 Alternatively or additionally, the material of the outer inflatable body may have a moderate air permeability in the permeable area, in particular an air permeability in the range of 3 to 20 L/m²s, preferably from 5 to 10 L/m²s. This further improves the air supply to the clothing item.

15 In one embodiment, the material of the outer inflatable body in the permeable area has a high air permeability, in particular an air permeability in the range of 100 to 250 L/m²s, preferably from 150 to 210 L/m²s. In this case the inner inflatable body may be designed to be tight, i.e., with an air permeability in the range 0 to 3 L/m²s, preferably from 0 to 1 L/m²s or with a moderate air permeability. In this way the escape of air over the contact area is limited to the amount necessary for drying of the seam of the clothing item which is in contact with the outer inflatable body in this area.

20 In the inflated state, a pressure ratio between the pressure in the outer inflatable body and the pressure in the inner inflatable body of 1:2.5 to 1:4.5, preferably from 1:3 to 1:3.5 prevails in the device. This pressure ratio is achieved through the essentially airtight design of the inner inflatable body. The pressure difference may also be adjusted accurately through the choice of the size of the air-permeable areas on the inner and outer inflatable bodies.

25 Air-impermeable areas of the inflatable body are preferably areas having an air permeability in the range of 0 to 3 L/m²s, preferably from 0 to 1 L/m²s. Open areas are the areas having an air permeability in the range of 100 to 250 L/m²s, preferably from 150 to 210 L/m²s. The values are preferably measured at a pressure difference of 100 Pa.

- 6 -

This invention is explained in greater detail below on the basis of the accompanying figures, which show:

Figure 1: a schematic perspective view of an embodiment of the inventive device;

Figure 2: a detailed view of a side part of an inner inflatable body of the embodiment of the inventive device to Figure 1;

Figure 3: a schematic perspective view of an outer inflatable body of another embodiment of the inventive device; and

Figure 4: a schematic cross-sectional view through an embodiment of the inventive device.

Figure 1 shows a device 1 consisting of an outer inflatable body 2 and an inner inflatable body 3. The outer inflatable body 2 is only partially indicated to allow a view of the inner inflatable body 3. The outer inflatable body 2 comprises a body section 21 and two arms sections 22 which are connected to the body section 21 via an arm opening 23 at the sides.

An inner inflatable body 3 is accommodated in the outer inflatable body 2. The inner inflatable body 3 is formed by two side parts 31 and 32 in the embodiment depicted here. One side part 31 of the inner inflatable body 3 is shown in greater detail in Figure 2. The design and functioning of the inventive device are explained below in particular with respect to this side part 31, which is shown as the left side part in Figure 1. The other side part 32, i.e., the right side part in Figure 1, has the same design and fulfills the same functions. The side part 31 has a body part 311; the body parts of the first and second side parts 31 and 32 are spaced a distance apart and together form the body section of the inner inflatable body 3. An arm piece 312 is arranged on the side of the side part 31. It is connected to the side part 31 by an arm piece opening. An opening 314 is provided on the end face 313 of the arm piece 312 through which opening the arm section 22 can be supplied with air.

- 7 -

- The body part 311 of the side part 31 of the inner inflatable body 3 is formed by an inside 4 on the sides facing the additional side part 32. In the embodiment depicted here, a cut section 41 having a high air permeability is incorporated into this inside 4 of the body part 311 at a medium height. The additional cut sections 42 and 43 of the inside 4 of the side part 31 are preferably designed to be tight. A connecting opening 44 through which the side part 31 can be connected to a fan of a housing (not shown) provided beneath the inflatable body 2 in the lower cut section 43 of the inside 4.
- 10 On the side opposite the inside 4, a cut section 5 which is incorporated into the body part 311 has a moderate air permeability in the range of 3 to 20 L/m²s, preferably in the range of 5 to 10 L/m²s, measured at a pressure difference of 100 Pa. This cut section 5 extends over the body part from the lower edge to the arm piece opening.
- 15 With the device 1 shown in Figures 1 and 2, a clothing item, especially a shirt can be smoothed in a simple and reliable manner. The clothing item is stretched onto the outer inflatable body 2, with the arm sections 22 of the outer inflatable body 2 being inserted into the clothing item and preferably secured there. Then air or steam is introduced by a fan into the inner inflatable body 3, preferably through the connecting opening 44. In the embodiment depicted here, air is introduced
- 20 in this way into both side parts 31 and 32. The air from the inner inflatable body 3 is directed into the arm section 22 of the outer inflatable body 2 through the opening 313 in the arm piece 312 and the corresponding opening in the arm piece of the side part 32, thereby causing the arm section to be inflated.
- 25 The body section 21 of the outer inflatable body 2 is supplied with air through an area 41 on the inside 4 of the side parts 31 and 32 of the inner inflatable body 3. The area 41 is designed to be air permeable so that the air introduced into the inner inflatable body 3 can pass through this area into the body section 21 of the outer inflatable body 2.

- 8 -

The inner inflatable body 3 is filled in this way and releases a certain amount of air to the outer inflatable body 2, causing the latter to inflate. The cross-sectional shape of the side parts 31 and 32 is selected so that together they produce an essentially oval shape in the body area. Due to this shape, the side parts 31 and 32 support the shape of the outer inflatable body 2 in the body section
5 which assumes the shape of the clothing item stretched onto the outer inflatable body 2. The side parts 31 and 32 may additionally be supported by having them supported on the inside 4 against a frame (not shown). This ensures reliable expansion of the body section 21 of the outer inflatable body 1 in the lateral direction. The shaping by the side parts 31 and 32 is accomplished essentially by the fact that they are in contact with the sides of the body section 21 of the outer
10 inflatable body 2 and press them apart there.

In locations where the side parts 31 and 32 are in contact with the outer inflatable body 2 in this way, the cut sections 5 of a moderate air permeability are provided, in this case forming the permeable areas. Thus, a greater amount of air can escape through these permeable areas over the
15 cut section 5 and the adjacent area of the body section 21 of the outer inflatable body 2 than is the case in the areas of the body section 21 adjacent to the permeable area. This greater release of air in the permeable area may occur because the amount of air released is determined by the prevailing pressure difference. Owing to the fact that the outer inflatable body 2 is supplied with air through the inner inflatable body 3 by means of specially provided air-permeable areas and
20 openings, a lower pressure, e.g., 100 to 120 Pa, prevails in the outer inflatable body 2 than in the inner inflatable body 3 which is supplied with air directly by a fan and in which a pressure of 400 Pa may prevail, for example. The pressure difference between the inner inflatable 3 and the environment is thus greater than the pressure difference between the outer inflatable body 2 and the environment. The permeable area which is provided according to this invention and is formed
25 by the cut section 5 of a moderate air permeability that is in contact with the outer inflatable body 2 supports the release of air so that the side seam of the clothing item which is in contact with the outer inflatable body 2 in this area can be dried reliably. The seams by means of which the cut section 5 of the permeable area is joined to the other cut sections of the body part 31, 32 of the inner inflatable body do not come in contact with the body section 21 of the outer inflatable body

- 9 -

2 and thus impressions on the clothing item can be prevented. Even if the seams of the inner inflatable body 3 come in contact with the outer inflatable body 2, this is not transmitted as interfering impressions on the clothing item because the material of the outer inflatable body 2 is between them. In the embodiment depicted here, the end faces 313, the cut section of the arm stop 312 and the cut sections which form the body 311, except for the inside 4, are all made of a material that has an air permeability in the range of 0 to 1 L/m²s, measured at a pressure difference of 100 Pa, i.e., the material is essentially tight. The cut sections 42 in the upper area of the inside and 43 in the lower area of the inside are preferably also formed by this tight material. The air-permeable area 44, however, preferably has an air permeability in the range of 150 to 210 L/m²s. These values are measured at a pressure difference of 100 Pa.

In the embodiment illustrated in Figures 1 and 2, the outer inflatable body 2 is designed to be essentially airtight in the contact area where it comes into contact with the permeable area 5 of the inner inflatable body 3 in the inflated state. In this area, however, a permeable area may also be provided at least partially on the outer inflatable body 3. Such an embodiment is indicated schematically in Figure 3 where cut sections 24 of a moderate air permeability are incorporated into the outer inflatable body 2 in the chest area, partially forming the permeable area 25. The permeable area 25 is formed here by the part of the cut sections 24 where they come in contact with the inner inflatable body 3 on the inside. If the inner inflatable body is in contact with the outer inflatable body 2 only on the sides, i.e., along the permeable area 5, then the permeable area 25 is formed on the outer inflatable body 2 only in the area where the cut section 24 is in contact with the permeable area 5. The other part of the cut section 24 does not function as a permeable area in the sense of this invention because the inner inflatable body 3 in this embodiment is not in contact with the outer inflatable body 2 in this area, i.e., there is no contact area here. A high air supply to the clothing item, in particular the side seam, can be achieved in the permeable areas 5, 25 due to the air permeability provided on the inner and outer inflatable bodies and also due to the contact existing between the inner and outer inflatable bodies.

- 10 -

Figure 4 shows another preferred embodiment in a sectional view. Here again, the inner inflatable body 3 is formed by two side parts 31, 32 which together form the body section of the inner inflatable body 3. This body section is surrounded by the body section 21 of the outer inflatable body 2 which has a structure like that of the outer inflatable body 2 shown in Figure 3. On the front side of the device, a clamping device 6 is provided, serving to secure the button strip of the shirt. This clamping device 6 at the same time ensures that the outer inflatable body 2 will be pressed against the inner inflatable body 3 over its entire front side, especially the side parts 31, 32. In addition, the side parts 31, 32 of the inner inflatable body 3 are designed so that on the whole they produce an oval shape of the outer inflatable body 2 in the body area. This is achieved by the fact that the sides of the side parts 31, 32 are in contact with the sides of the body area 21 of the outer inflatable body 2 and press them apart, i.e., into an oval shape. On the back side of the device there is no contact between the inner and outer inflatable bodies. The back section of a shirt is situated in this area, usually being designed as a single layer and therefore requiring only a limited air supply to smooth it.

In the embodiment in Figure 4, the contact area thus extends over the entire front side of the device, except the distance between the two side parts of the inner inflatable body, up to the sides of the body section and beyond them to a certain extent. To facilitate an understanding, a slight distance has been left between the inner and outer inflatable bodies in this area as well. With the inventive device in this embodiment, however, the two inflatable bodies are in direct contact in this area. The permeable area in the embodiment depicted here is also formed over a large area. The cut sections, indicated by dotted lines, in particular the cut sections 5 of the inner inflatable body 3 and the cut sections 24 of the outer inflatable body 2 have a moderate air permeability. Thus, the permeable area at chest height extends beyond the chest areas and the side parts so it is formed by the cut sections 5 and 24 at chest height.

Below chest height, i.e., in the waist and hip area, there is contact between the inner and outer inflatable bodies on the front side extending to the sides, but there is no permeable area here in the sense in the present invention because at this height both the material of the inner inflatable

- 11 -

body and that of the outer inflatable body are designed to be tight on the front side, i.e., having an air permeability of 0 to 3 L/m²s. Therefore, the permeable area at waist or hip height is only provided on the sides of the body section where the cut section 5 of the inner inflatable body 3 in contact with the outer inflatable body 2. In this way, the side seam of the clothing item can also be dried at this height without having to fear loss of air on the front side.

The present invention is not limited to the embodiment depicted here.

It is also possible according to this invention to provide permeable areas in other positions where a seam of the clothing item must be dried. For example, a material having a moderate air permeability may be provided on the lower side on the arm piece of the inner inflatable body which is in contact with the arm section of the outer inflatable body in the inflated state. This would make it possible to dry the arm seam.

The permeable area may be formed according to this invention by all or part of the contact area. The permeable area is located where the inner inflatable body and/or the outer inflatable body has at least a moderate air permeability and the two inflatable bodies are in contact with one another. Combinations are also possible in the permeable area in that the inner inflatable body may have a moderate air permeability while the outer inflatable body also has a moderate air permeability. Alternatively, the outer inflatable body may be designed to be tight in this area. In addition, it is also possible to design the inner inflatable body to be tight in the permeable area and the outer inflatable body to have a high air permeability, i.e., to be open.

An ideal smoothing result can be achieved through the combination of the contact of the two inflatable bodies and the increased air permeability of the materials provided in this area.